

# **FIRE STATION RELOCATION**

## EXECUTIVE DEVELOPMENT

by

Thomas L. Thompson

Miami Beach Fire Department

Miami Beach, Florida

An applied research project submitted to  
the National Fire Academy  
as part of the Executive Fire Officer Program.

February 1998

## **ABSTRACT**

The Miami Beach Fire Department needed to replace Fire Station 4, which was located in the North Beach area.

The North Beach area had experienced a significant increase in population and a corresponding increase in demand for fire and emergency medical services. It was necessary to move additional resources to Fire Station 4 to handle the increased workload.

The fire station was old and in poor condition. It was not large enough to adequately house additional personnel, and the bays were too small for modern fire apparatus. The station was poorly located and built on waterfront property. It flooded easily during tropical storms.

The City of Miami Beach planned to sell the valuable waterfront property. Rebuilding a new fire station on the existing site was not an option.

The purpose of this research project was to determine the best available location for a replacement fire station for the North Beach area..

The project employed historical research by way of conducting a literature review to determine the criteria and methodology the national service organizations have recommended regarding fire station relocation.

The project also utilized descriptive research in the form of a survey to determine what criteria other fire departments had used in the site selection process.

Finally, action research, by way of a computerized modeling program was employed to make the final site determination.

It was found that the majority of fire departments surveyed utilized the recommendations of the national service organizations in fire station site determination, the exception being that most do not utilize computerized modeling to assist in the process.

The national service organizations continue to use site selection criteria which have been the standards for decades, such as fire risk, response distances and response time. Emergency medical services are not mentioned.

The computerized modeling software simplified the selection process. The available sites were compared this program and a selection made.

The best available site for a replacement fire station for the North Beach area was Site #1, located at 7300 Harding Avenue (Appendix D).

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## **INTRODUCTION**

The Miami Beach Fire Department provides fire, emergency medical and fire safety services to a diverse community of 92,000 residents. Miami Beach is an island community, seven square miles in size, and is connected to the mainland by four causeways. The fire department employs 190 sworn personnel, and operates out of four (4) fire stations. The department responds to 21,000 requests for service annually, with 18,000 of those requests being for emergency medical services.

Fire Station 4 in the North Beach area is badly deteriorated, and no longer meets the needs of the Miami Beach Fire Department. It must be replaced. The fire station was originally built on waterfront property. Waterfront property is highly prized for residential development, and the value of the property has increased dramatically. The City of Miami Beach plans to sell the property. Building a new fire station on the existing site is not an option.

The purpose of this research project is to determine the best available location for a replacement fire station for the North Beach area. Historical, descriptive and action research methods were employed to answer the following questions:

- 1) What are the recommendations of the major service organizations regarding fire station selection?
- 2) What are other departments doing?

- 3) What potential sites are available?
- 4) What site selection criteria will be used?

## **BACKGROUND AND SIGNIFICANCE**

Fire Station 4 in the North Beach was constructed in 1937. The station was a two story design, with two apparatus bays and a small office on the first floor and the living quarters upstairs. The facility was built to house the apparatus of the day, specifically the American LaFrance 700 series fire engine.

In the early 1960s, a large bay was built onto the rear of the station to house the department's new American LaFrance 100 foot aerial ladder truck. A large dormitory was constructed on the second floor over the new ladder truck bay.

Fire Station 4 remained virtually unchanged until 1984, when the living area on the second floor was refurbished.

In 1990, the department began an apparatus replacement program to replace its aging fleet with modern apparatus. The two original apparatus bays at Fire Station 4 were too small to accommodate modern fire engines. The aerial ladder truck was relocated to another fire station, and the new fire engine was placed in the now vacant ladder truck bay. The two original bays were now used to house ambulances, for which they were barely adequate.

In the 1960s and 70s, Miami Beach was a quiet retirement community. The residents were predominately Jewish retirees, many of whom were former garment industry workers from New York. The majority of the elderly retirees lived in the South Beach area. Many were in poor health, and the demand for emergency services in the area was quite high.

In contrast, the North Beach area was populated predominately by seasonal residents. The neighborhood was residential, consisting mostly of single family homes and one and two story apartments. There were two small commercial areas along the main thoroughfares. There were several multistory hotels along the beach front, but no industry to speak of. Fire hazard levels were modest. The demand for emergency services was low.

In 1980, a massive influx of Cuban refugees occurred in South Florida, which became known as the Mariel Boatlift. Thousands of these immigrants settled in the South Beach area. Most spoke little or no English, and were of the Catholic faith.

This clash of cultures, both ethnic and religious, was too much for some South Beach residents. Former South Beach residents began to migrate to the North Beach area. A slow but steady population shift to the north had begun.

In the late 1980s, and into the 90's, a renaissance in the South Beach historical district occurred. Developers spent hundreds of millions of dollars rebuilding the South Beach area. The onetime retirement community became trendy, affluent and very expensive. Over 15,000 new residents moved to the area.

The increases in population and cost of living were more than many of the remaining South Beach retirees could take. Citizens began to leave South Beach in large numbers, and relocate to the North Beach (Miami Beach, 1997, p. 102).

The demand for emergency services in the North Beach area, especially medical services, began to rise dramatically. The ambulance assigned to Fire



Station 4 went from being the least utilized on Miami Beach to one of the busiest in the entire country (Firehouse, 1997, p. 127).

The fire engine at Fire Station 4, which was certified by the State of Florida as an Advanced Life Support unit, also experienced a large increase in requests for service. These requests were predominately medically related as well. Engine 4 was now the busiest fire engine on Miami Beach (Jordan, 1998).

The resources available in the North Beach area were being overwhelmed by the increased demand for services. The decision was made to move an underutilized ambulance unit from the Middle Beach area to Fire Station 4. The additional unit was scheduled to be moved in early 1998.

The deficiencies of Fire Station 4 were now increasingly apparent. The building was not designed to house any additional personnel. The large dormitory would have to be divided into two small sleeping facilities to house the new personnel. The kitchen and dining facilities were inadequate. Not enough storage was available, nor were there adequate locker facilities. The National Fire Protection Association states that “fire stations shall be designed to meet their respective service demands in terms of space for practical utilization by apparatus and personnel” (NFPA, 1994, 17-6.3.2). Clearly, that was not the case with Fire Station 4.

Fire Station 4 had no facilities for females, who were being actively recruited by the department. Separate facilities for males and females are a must, according to the Fire Chiefs Handbook (Fire Engineering, 1995, p. 492). The station did not comply with the guidelines of the Americans with Disabilities Act.

Finally, Fire Station 4 was geographically in a poor location. It was on the waterfront, and prone to flooding during tropical storms. This meant that the

station would have to be evacuated during those storms, leaving the neighborhood unprotected.

The station was located at the extreme southern end of the geographic area it was to protect, and the waterfront property it was built on was prized for development, as discussed in the introduction.

Proper research methodology, and problem solving techniques, such as those taught in the National Fire Academy's Executive Development program will be utilized to determine the best available location for a replacement fire station for the North Beach area.

## **LITERATURE REVIEW**

Relocating a fire station is a costly undertaking which will impact the fire department and the surrounding community for years to come. The decision to relocate must be justifiable and based on current, accurate information. Contemporary literature on the topic identifies several key reasons for fire station relocation.

### **INCREASE IN POPULATION**

An increase in population in the area to be protected was commonly cited as a reason to consider relocation. Architect Paul J. De Silva wrote that the increase of the population of a district and the resulting impact on service levels as a reason to relocate (De Silva, 1989, p. 79). Jim Gallagher wrote in Fire Command that an area that has experienced an increase in population may show an increase in requests for service, and that data may provide

justification for relocation of a fire station (Gallagher, 1989, p. 33). The National Fire Protection Association states that communities should anticipate such population increases as part of an overall master plan for community fire protection (NFPA, 1994).

#### EXISTING FACILITIES ARE OBSOLETE

Another key reason to consider relocating a fire station is that the station has become obsolete. The International City Manager's Association recommends that as part of planning for community protection, "a facilities inventory should include the location, size, and age of fire stations and other facilities. A description of the adequacy of the facilities and projected relocations should be included" (ICMA, 1988. P.88). Age is specifically singled out as a key reason. Older fire stations many times cannot accommodate modern fire equipment. De Silva wrote "in older fire stations, in particular, the bay heights and widths are not able to handle the larger, more modern apparatus" (1989).

#### EXISTING FACILITIES ARE POORLY LOCATED

Fire stations are often built in less than ideal locations. Many times this is also a result of the age of the facility. The Syracuse Fire Department had fire stations that were built when the Erie Canal still divided the city. Fire stations had been built on both sides of the waterway so that fire apparatus would not have to cross over the water on inadequate bridges. The waterway was later filled, leaving fire stations that were too close together (Reeves, 1995, p. 36).

New freeways, railroad track beds and other manmade obstacles can reduce the effectiveness of a fire station. Such obstructions can greatly increase the distance that responding apparatus must traverse.

Finally, a station may be considered obsolete if it should never have been built at its existing location in the first place. Miami Beach Fire Station 4 is a case in point. It was built on waterfront property, and is prone to flooding during violent weather, particularly hurricanes. The Fire Chief's Handbook states that "a fire station is expected to continue to function during these types of disasters" (1995). Jim Gallagher agrees, stating that "the height of a storm could be the worst time for a company to be out of service. The problem of flooding needs to be explored carefully" (1989).

#### CHANGE IN LAND USE

A change in land use can significantly alter the effectiveness of a fire station by increasing or decreasing the fire risk in the area to be protected. It can cause the increase or decrease of apparatus and manpower assigned there, or cause the station to be eliminated altogether. An example would be the elimination of an inner city fire station because most of the residents have moved away (Susan B. Benton, Neal D. Carpenter, 1987, p. 11).

Once the decision to relocate a fire station has been made, a number of factors must be considered in selecting the new site. A number of service organizations have published recommendations on site selection. Interestingly, all of the information reviewed for this study addressed the issue of station location from a fire standpoint only. No mention of emergency medical service needs were found. Since many departments respond to many more requests for emergency medical services than to fires, this seems to be a serious oversight.

#### RESPONSE TIME

The majority of the literature mentioned response time as the most important factor in selecting a site for a fire station. The International City

Manager's Association has written "the location of fire stations is based on the theory that a rapid response is essential to protecting life and property since fire spread is largely a function of time" (William Gay and Alan Siegel, 1987). There seems that most service organizations support that view. The National Fire Protection Association places considerable emphasis on the arrival of the nearest fire company, and recommends "equal response time from all parts of the area" (Emmanuel Mesagna, John Baroni, 1991, p. 9-100).

#### RESPONSE DISTANCE

Response distance is another frequently cited factor in fire station relocation. The Insurance Service Organization requires an engine company every 1.5 miles in the built up areas of a city (Fire Engineering, 1995, p. 195). Both the International City Manager's Association (1988) and The National Fire Protection Association (1991) make specific reference to response distances. This approach may not be as useful as using response time as "fire engines...can't reach an emergency scene as the crow flies" (Pieter Sybesma, 1995, p. 55).

#### FIRE RISK

The actual fire risk based on previous fire loss and on specific target hazards should also be considered. "Fire suppression data should include the numbers and types of incidents that occur by occupancy type and area of the community..." (ICMA, 1988, p. 88).

The method used to determine the appropriate fire station site using these factors can be accomplished in a number of ways. The most frequently mentioned make use of sophisticated models and grid maps that are

superimposed over actual street maps of the area to be protected (Sybesma, 1995).

The National Fire Protection Association and the International City Manager's Association have written articles addressing the use of computers to simplify the task of identifying the most suitable location for a replacement fire station. "There are more than twenty commercial companies that produce and distribute computer software for fire service applications. Many of these are turnkey packages that require little or no training to operate" (John Watts, 1991, p. 10-143). Programs such as these would greatly simplify the task of site determination. Previously, it would have required a mainframe computer to conduct the detailed analysis necessary for this task. Now, it can be done on a personal computer, using off the shelf software (William Gay, Alan Seigel, 1987).

In summary, the literature reviewed provided input on when it is appropriate to replace a fire station, what criteria to consider when selecting a new site, and the means to accomplish this selection process. All of these factors will be considered to conclude this project.

## **PROCEDURES**

The purpose of this applied research project was to determine the best available location for a replacement fire station for the North Beach area. Part of the research was historical in nature. This consisted of a literature review to determine what criteria the national service organizations and other subject matter experts used to determine if a fire station should be replaced, what

factors should be considered when selecting a new site, and the most effective method of using the information gathered to perform the actual selection.

Descriptive research was also utilized. A survey (Appendix A) was developed and distributed to fifty fire departments throughout the state of Florida. The departments were selected at random. Thirty three of the surveys were returned. The data from the surveys was analyzed to determine which departments had recently built a new or replacement fire station, why they had done so, and the criteria used in site selection. Additional information on computerization and the use of computerized modeling was also obtained.

Finally, action research was employed to determine the best available location for the replacement fire station. A personal computer and location mapping software were utilized to construct computerized models of several potential fire station locations, and the impact each would have on the provision of fire and emergency medical services.

#### ASSUMPTIONS AND LIMITATIONS

For the purposes of this research, there is an assumption that the Miami Beach Fire Department did desire and show the need to replace Fire Station 4. Limitations to this research project include the following:

- 1) It was found during the literature review that portions of the research were dated. A significant amount of the research was conducted in the late 1980's. Other portions of the data, specifically that utilized by the national service organizations, had been in use for decades.

- 2) None of the research addressed the delivery of emergency medical services.
- 3) The amount of available property in the North Beach area is limited. The condemnation of existing residential structures for the purpose of constructing a fire station would be unacceptable, both politically and from a public relations point of view. Therefore, only vacant properties would be considered in the site selection process.

## **RESULTS**

The following are answers to the research questions posed earlier in this document.

### Research Question 1

The national service organizations made a number of recommendations as to when to consider relocating or replacing a fire station, criteria to consider when selecting a site, and methods of choosing the best site.

A change in population of the area to be protected was cited as a reason to relocate a fire station, as was a change in land usage. Obsolete or poorly located fire stations were given as other reasons.

Factors to consider when selecting a new site included response times, response distances and fire risk of the area to be protected.



The use of computerized modeling, based on the above mentioned criteria was recommended as a method that was accurate, timely and cost efficient tool to determine the best available site for a replacement fire station.

### Research Question 2

An analysis of the data provided by the survey (Appendix A) received from other departments showed that 73% of those departments who replied to the survey had recently constructed/relocated a fire station, or were considering doing so. Of those departments, The criteria considered most frequently were the desire to improve response times (51%), a response to an increase in population (48%), and that existing facilities were obsolete (42%). A surprising number of departments cited little or no cost factor (27%) as a reason for selecting a site.

The data regarding computerization was particularly interesting. Of those departments that had recently built or were considering building a station, 100% reported that their department utilized computers, but only 38% used computer modeling during site selection. This data suggests that while most departments are following the recommendations of the national service organizations regarding site selection, many of which are decades old, some may be hesitant to use technology to assist in the decision making process.

### Research Question 3

A reconnaissance of the North Beach area identified only thirteen (13) vacant properties to evaluate as a potential fire station site. Of these available sites, six (6) were removed from consideration for the following reasons:

- 1) One site was much too small to be useful.

- 2) One site abutted a city park and playground. Locating a fire station next to a playground would be a potential hazard to children and a legal liability to the department.
- 3) Two sites were located at the city limits, north and west respectively.
- 4) One site was located on the waterfront, and would be subject to the same storm hazards as the existing fire station.
- 5) One site was located only one (1) city block from the existing station. Any advantage over the existing station would be minimal, and not cost effective.

This left only seven (7) potential building sites to consider for the project. Coincidentally, all seven of those sites were owned by the municipality. The decision had been made to use computerized modeling as recommended by the national service organizations. This was done to simplify the task, as well to legitimize the process. The following of nationally recognized standards is considered good practice in the fire service, and could reduce liability (Alan V. Brunicini, 1992, p. 30) . The geographical data on these seven sites would be inputted in a personal computer that was programmed with fire station site selection software. The criteria to be used in the selection process is discussed below in the next section. The resulting grid maps produced can be seen in Appendix C through J.

#### Research Question 4

Several site selection criteria were used in the site determination process, all based on recommendations of the national service organizations.

The primary consideration was response time. Alan Clark wrote that “in order to affect the most desirable result, the time element must be decreased” (1986, p. 28). Response times are more critical from an emergency medical standpoint than fire suppression. The American Heart Association recommends delivering medical services to a patient in cardiac arrest within four to six minutes to prevent permanent brain damage. Death is imminent beyond ten minutes (Dennis L. Rubin, 1997, p. 72). The goal of the Miami Beach Fire Department was to place an advanced life support unit on the scene of an incident within three to five minutes. These time constraints were entered into the computer modeling program.

Another consideration was response distance. To be able to meet the time constraints the department desired regarding response times, the site selected would have to be more or less centrally located. Conditions that could hinder emergency vehicle response, such as bridges, one way streets and congested areas were noted. A speed limit of thirty miles per hour was used for the computerized modeling.

Fire risk was the last consideration. North Beach does not have anything that could be considered a high risk or target hazard. The commercial areas did pose a modest risk, as did some of the older hotels. Most of these occupancies had fire sprinkler systems. Fire risk had little impact in the computer model.

## **DISCUSSION**

The goal of this research was to determine the best available location for a replacement fire station for the North Beach area. The site selected has a number of advantages over the old site. The new site is much more centrally located. Consequently, Both response times and response distances are reduced for the majority of the area to be protected. Secondly, by selecting a parcel of property that the municipality already owns, a considerable cost savings is realized. This particular lot was a metered parking area. The public rarely used the lot and the revenue produced was minimal. Third, the new site was located away from the water, so the threat of flooding during tropical storms is lessened. The lot is sufficient size to allow the construction of a facility large enough to meet the current and future needs of the department. Finally, by constructing a new station at a different location, the day to day operation of the personnel assigned to Fire Station 4 will not be disrupted, as it certainly would be if an attempt was made to refurbish the existing facility, or demolish it and rebuild on the same site.

The use of computer modeling greatly reduced the amount of time required to perform the site selection process, as opposed to using mathematical computation and other similar approaches. The software is definitely worth the investment. It was surprising that the survey results showed that only a small percentage of departments are taking advantage of this tool.

The national service organizations need to include emergency medical response into the station location equation. The fire service provides emergency medical response to a large portion of the nation. Most departments that provide this service soon find that it represents the majority

of the department workload. This needs to be taken into consideration when planning for a new station.

## **RECOMMENDATIONS**

Due to an increase in population in the North Beach area, and the subsequent increase in requests for service, it became necessary to move additional resources to Fire Station 4.

Fire Station 4 needs to be replaced. It is too small to accommodate additional personnel and modern fire apparatus. It does not have separate facilities for females and does not provide access to the disabled. The fire station is poorly located at the southwest corner of the area it is to protect, and the waterfront location makes it prone to flooding during tropical storms.

The Miami Beach Fire Department wants to find the best available location to build a replacement fire station. The recommendations of the national service organizations were used to assist in the decision making process.

A computerized modeling program was used to compare the available sites, using the criteria of fire risk, reduced response time and reduced travel distances.

Based on these guidelines, Site # 1, located at 7300 Harding Avenue (Appendix D) is recommended as the best available location for a replacement fire station for the North Beach area.

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**APPENDIX A**  
**NATIONAL FIRE ACADEMY**  
**EXECUTIVE FIRE OFFICER PROGRAM**  
**FIRE STATION PLACEMENT SURVEY**

Please check the appropriate answer:

**1. What is the population of the area protected by your department?**

less than 10,000 \_\_\_\_\_

10,000 to 99,000 \_\_\_\_\_

100,000 to 999,000 \_\_\_\_\_

**2. Is your department:**

Paid \_\_\_\_\_

Volunteer \_\_\_\_\_

Combination \_\_\_\_\_

**3. What is the number of firefighters employed by your department?**

Less than 50 \_\_\_\_\_

50 to 99 \_\_\_\_\_



100 to 999 \_\_\_\_\_

1,000 to 1,999 \_\_\_\_\_

2,000 or more \_\_\_\_\_

**4. What services does your department provide? (check all that apply)**

Fire Suppression \_\_\_\_\_

First Responder \_\_\_\_\_

Emergency Medical Services \_\_\_\_\_

Hazardous Materials Emergency Response \_\_\_\_\_

Disaster (natural or manmade) Response \_\_\_\_\_

Fire Prevention/Education \_\_\_\_\_

Emergency Management \_\_\_\_\_

Other (please specify) \_\_\_\_\_

**5. Has your department recently constructed/relocated a fire station, or are you considering doing so?**

Yes \_\_\_\_\_

No \_\_\_\_\_

**6. What criteria did you consider when determining the site location? (check all that apply).**

Hazard level of the area to be protected \_\_\_\_\_

Topography of the area \_\_\_\_\_

Increase in population \_\_\_\_\_

New residential or industrial development in the area \_\_\_\_\_

Acquisition/annexation of new area \_\_\_\_\_

Desire to improve response times \_\_\_\_\_

Desire to improve ISO rating \_\_\_\_\_

Desire to decrease travel distance \_\_\_\_\_

Response to increased requests for service in the area \_\_\_\_\_

Site available at low cost/no cost \_\_\_\_\_

Existing facility obsolete \_\_\_\_\_

Existing facility poorly located \_\_\_\_\_

Other (specify) \_\_\_\_\_

**7. Does your department use computers?**

Yes \_\_\_\_\_

No \_\_\_\_\_

**8. Did your department use computerized modeling to assist in site determination?**

Yes \_\_\_\_\_

No \_\_\_\_\_

**Thank you for completing this survey. PLEASE RETURN IT BY FAX  
TO THE SENDER BY FEBRUARY 1, 1998 AT THE  
FOLLOWING ADDRESS:**

Assistant Fire Chief Thomas Thompson

Miami Beach Fire Department

2300 Pinetree Drive

Miami Beach, FL 33140

Fax # (305) 673-7881

If you would like a copy of the survey results, please contact me at  
(305) 673-7120.

**APPENDIX B**  
**NATIONAL FIRE ACADEMY**  
**EXECUTIVE FIRE OFFICER PROGRAM**  
**FIRE STATION PLACEMENT SURVEY**

Please check the appropriate answer:

**1. What is the population of the area protected by your department?**

less than 10,000      4

10,000 to 99,000      20

100,000 to 999,000      8

1,000,000 or more      1

**2. Is your department:**

Paid      20

Volunteer      0

Combination      13

**3. What is the number of firefighters employed by your department?**

Less than 50      15

50 to 99	<u>2</u>
100 to 999	<u>15</u>
1,000 to 1,999	<u>1</u>
2,000 or more	<u>0</u>

**4. What services does your department provide? (check all that apply)**

Fire Suppression	<u>33</u>
First Responder	<u>20</u>
Emergency Medical Services	<u>26</u>
Hazardous Materials Emergency Response	<u>19</u>
Disaster (natural or manmade) Response	<u>26</u>
Fire Prevention/Education	<u>30</u>
Emergency Management	<u>19</u>
Other (please specify)	<u>11</u>

**5. Has your department recently constructed/relocated a fire station, or are you considering doing so?**

Yes	<u>24</u>
No	<u>9</u>

**6. What criteria did you consider when determining the site location?  
(check all that apply).**

Hazard level of the area to be protected

\_\_\_\_\_ 12 \_\_\_\_\_

Topography of the area \_\_\_\_\_ 12 \_\_\_\_\_

Increase in population \_\_\_\_\_ 16 \_\_\_\_\_

New residential or industrial development in the area \_\_\_\_\_ 13 \_\_\_\_\_

Acquisition/annexation of new area \_\_\_\_\_ 9 \_\_\_\_\_

Desire to improve response times \_\_\_\_\_ 17 \_\_\_\_\_

Desire to improve ISO rating \_\_\_\_\_ 10 \_\_\_\_\_

Desire to decrease travel distance \_\_\_\_\_ 13 \_\_\_\_\_

Response to increased requests for service in the area \_\_\_\_\_ 11 \_\_\_\_\_

Site available at low cost/no cost \_\_\_\_\_ 9 \_\_\_\_\_

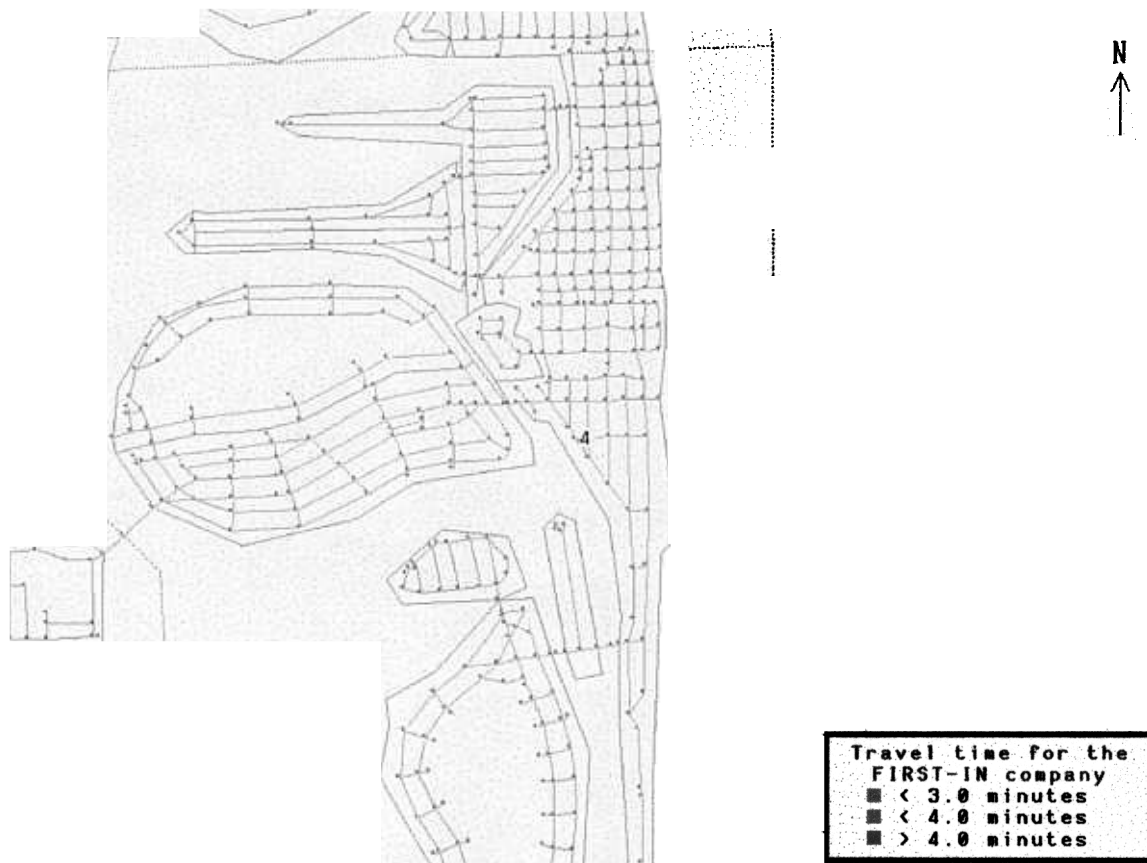
Existing facility obsolete \_\_\_\_\_ 14 \_\_\_\_\_

Existing facility poorly located \_\_\_\_\_ 10 \_\_\_\_\_

Other (specify) \_\_\_\_\_ 1 \_\_\_\_\_

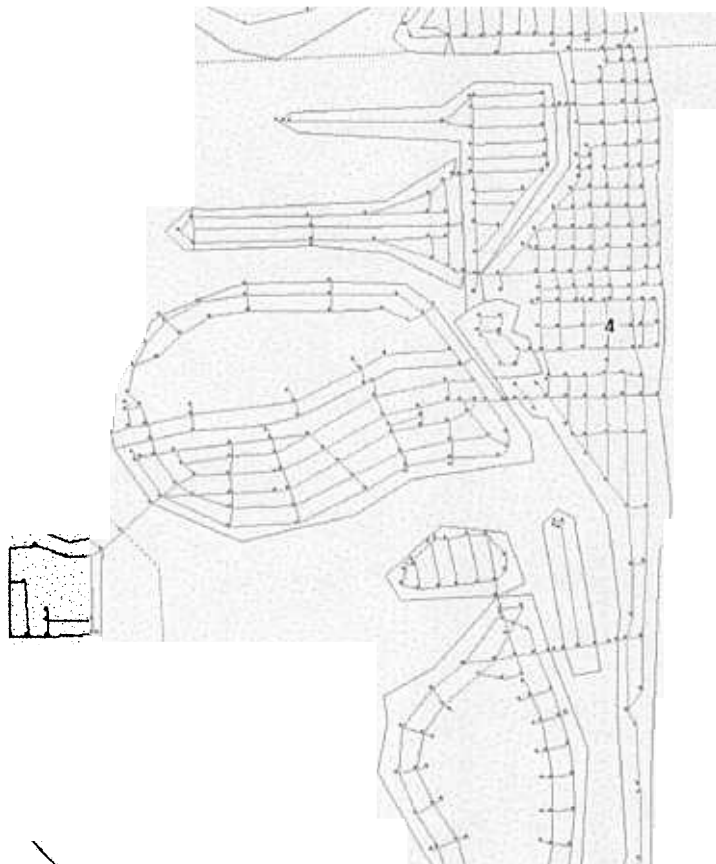
**7. Does your department use computers?**Yes 24No 0**8. Did your department use computerized modeling to assist in site determination?**Yes 9No 15

**APPENDIX C**  
**FIRE STATION 4**  
**6880 INDIAN CREEK DRIVE**



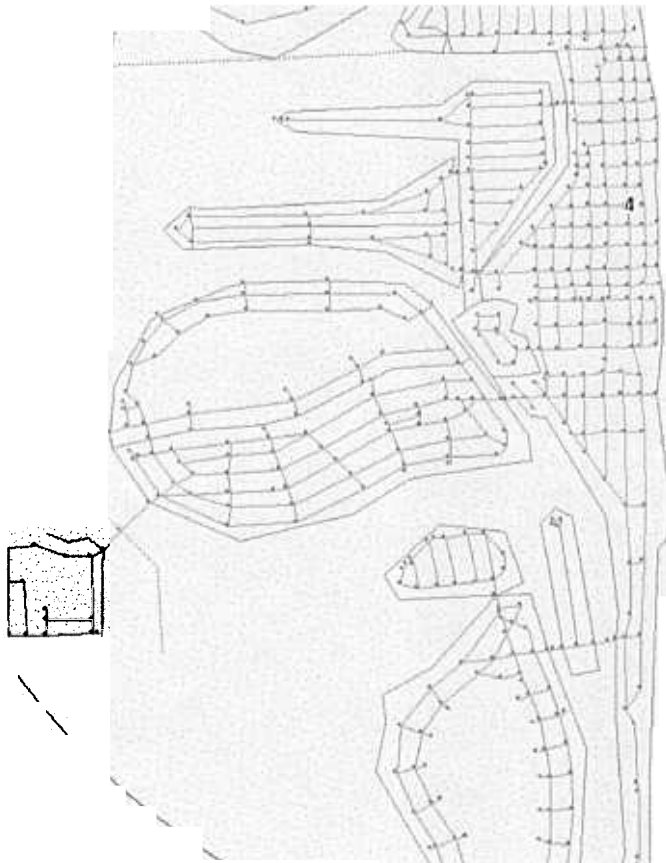


**APPENDIX D**  
**SITE 1**  
**7300 HARDING AVENUE**



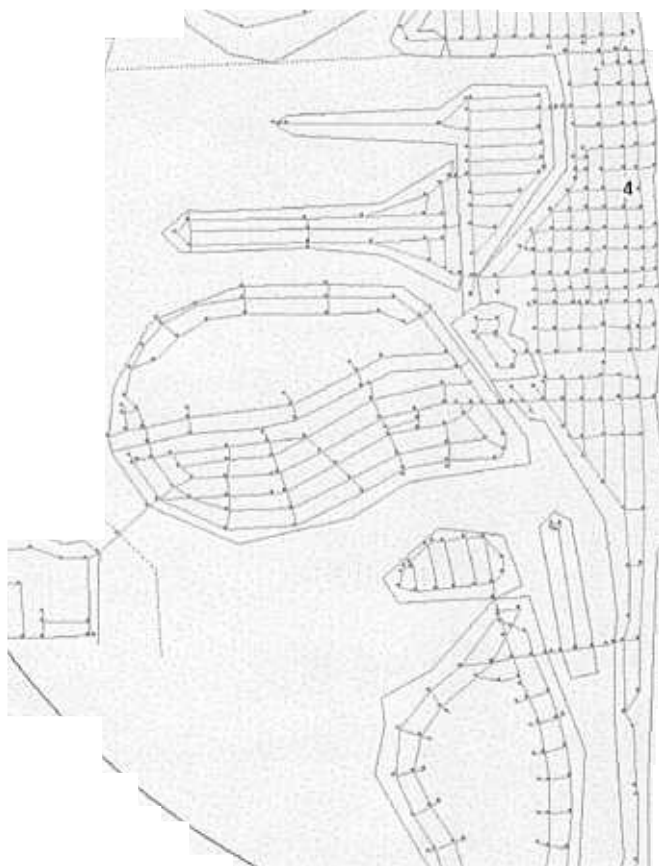
Travel time for the  
FIRST-IN company  
■ < 3.0 minutes  
■ < 4.0 minutes  
■ > 4.0 minutes

**APPENDIX E**  
**SITE 2**  
**7900 COLLINS AVENUE**



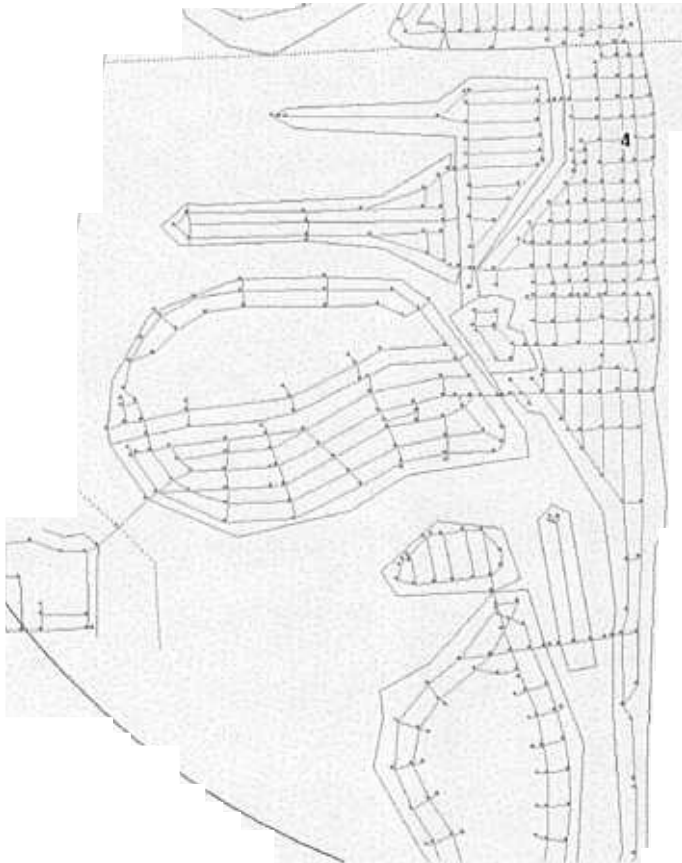
Travel time for the  
FIRST-IN company  
■ < 3.0 minutes  
■ < 4.0 minutes  
■ > 4.0 minutes

**APPENDIX F**  
**SITE 3**  
**8000 COLLINS AVENUE**



Travel time for the  
FIRST-IN company  
■ < 3.0 minutes  
■ < 4.0 minutes  
■ > 4.0 minutes

**APPENDIX G**  
**SITE 4**  
**8200 COLLINS AVENUE**

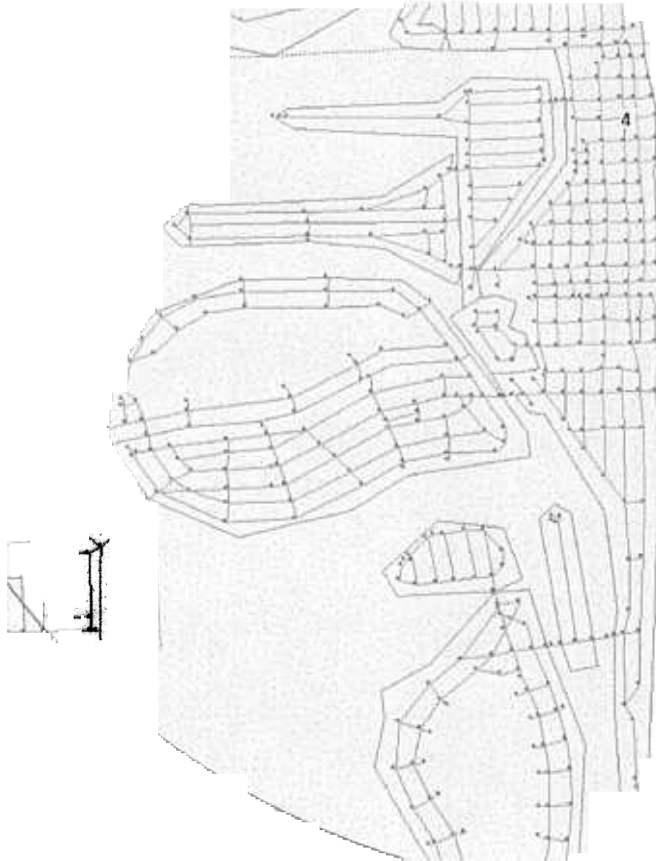


Travel time for the  
FIRST-IN company  
■ < 3.0 minutes  
■ < 4.0 minutes  
■ > 4.0 minutes



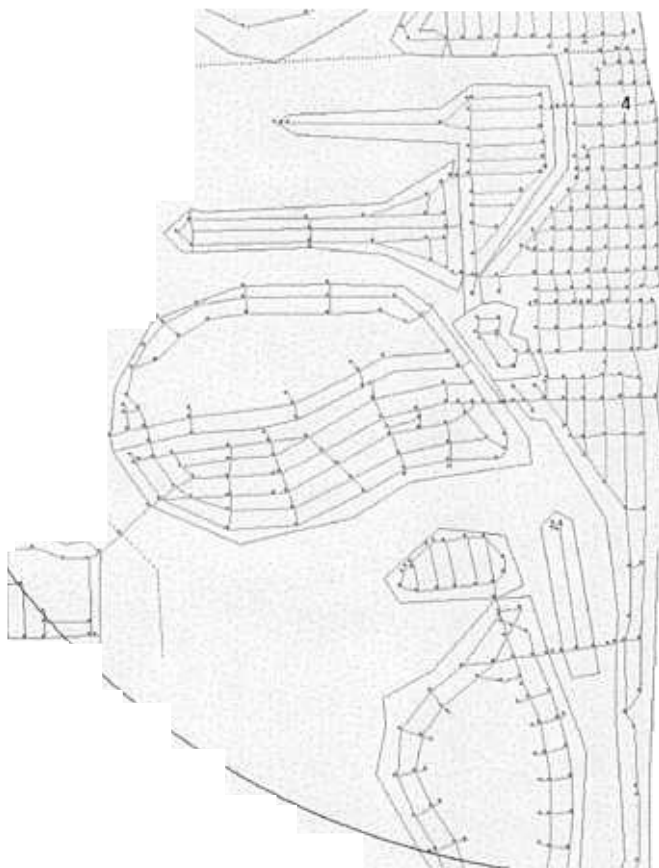
31

**APPENDIX H**  
**SITE**  
**8300 COLLINS AVENUE**



Travel time for the  
FIRST-IN company  
■ < 3.0 minutes  
■ < 4.0 minutes  
■ > 4.0 minutes

**APPENDIX I**  
**SITE 6**  
**8400 COLLINS AVENUE**



Travel time for the  
FIRST-IN company  
■ < 3.0 minutes  
■ < 4.0 minutes  
■ > 4.0 minutes

**APPENDIX J**  
**SITE 7**  
**8500 COLLINS AVENUE**

